Vernalis Adaptive Management Plan (VAMP)

What have we learned?

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Vernalis Adaptive Management Plan (VAMP)

What have we learned?

- Survival in 2006 appears to have been higher with lower exports

- No clear relationship between F/E ratio and smolt survival in range tested w/o barrier

- Survival has been low since 2003

- Need to measure survival at exports of 1500 with flows of 7000 and HORB

- Need to continue measuring survival with and without HORB

- Need to identify sources/locations of mortality

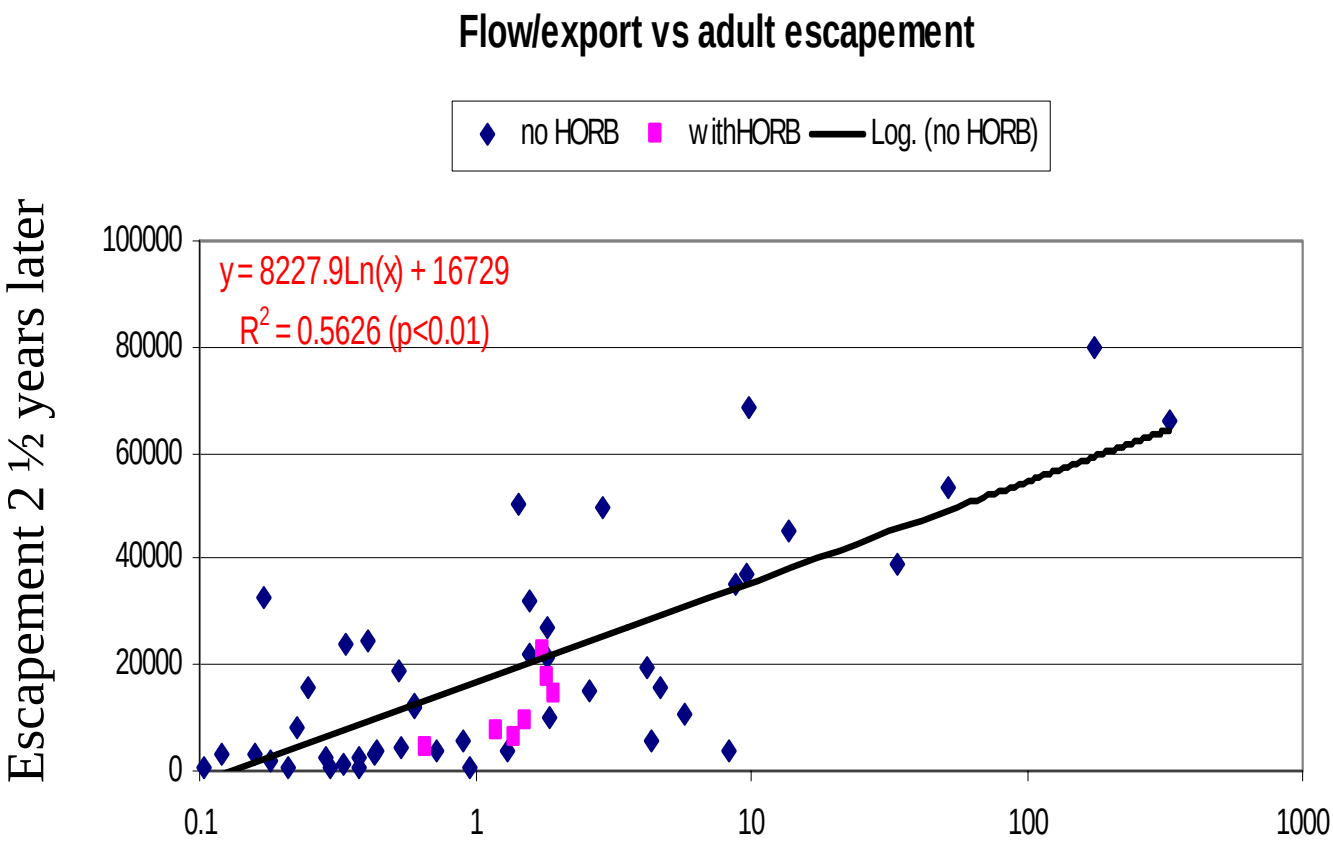
Vernalis Adaptive Management Plan (VAMP)

EWA and B2 assets were used in 2006
to reduce exports
for high and low export experiment

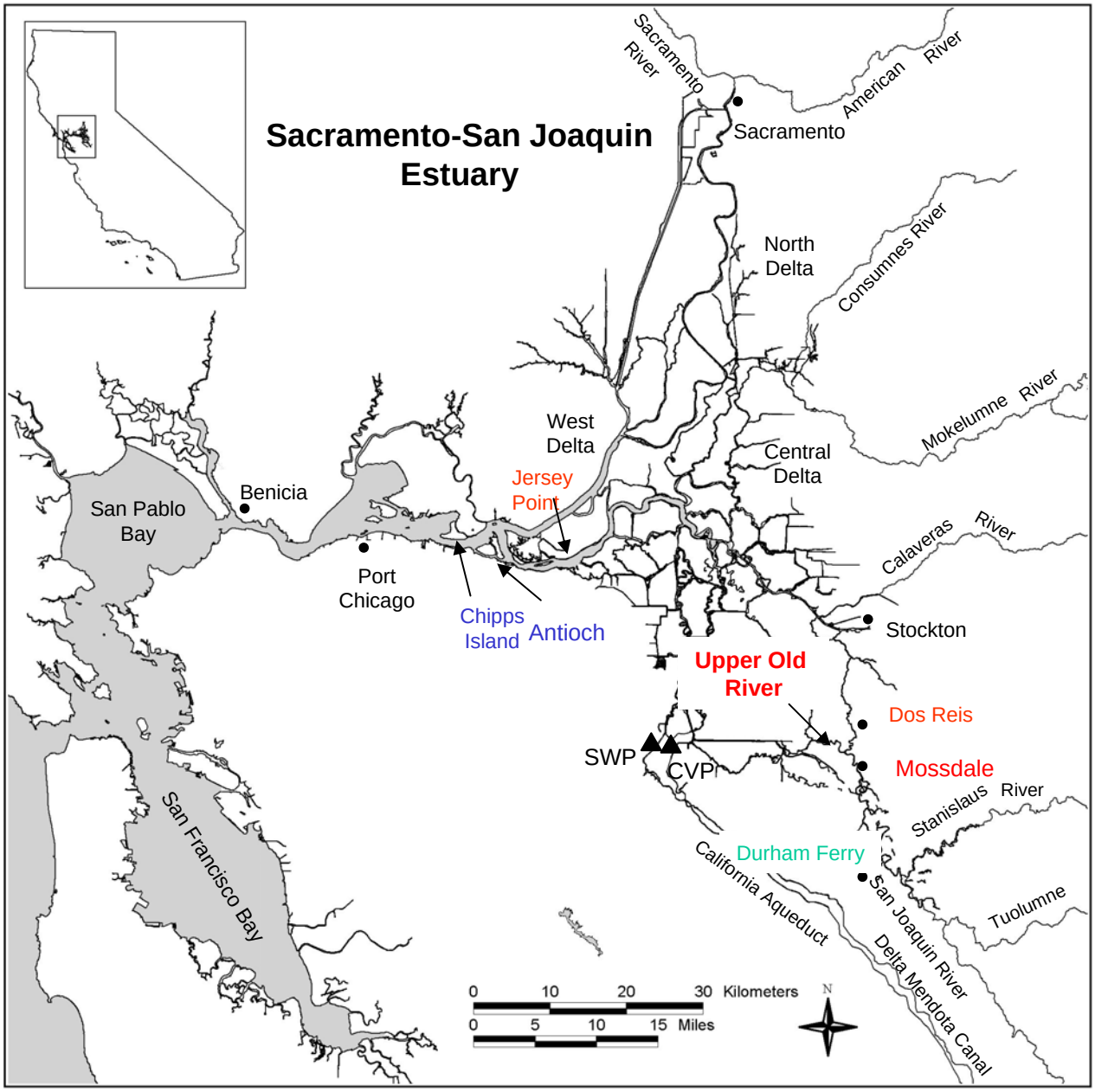
WHY VAMP?

To better understand how flow/exports affect juvenile salmon survival through the Delta for salmon originating from the SJ tributaries with and without the HORB in place

Conceptual model of how smolt survival may vary with flow/exports



Mean Flow/Export Ratio between April 15 and June 15 (1951 to 2003) and escapement 2 ½ years later



VAMP release sites in the Sacramento-San Joaquin Estuary, California.

Methods:

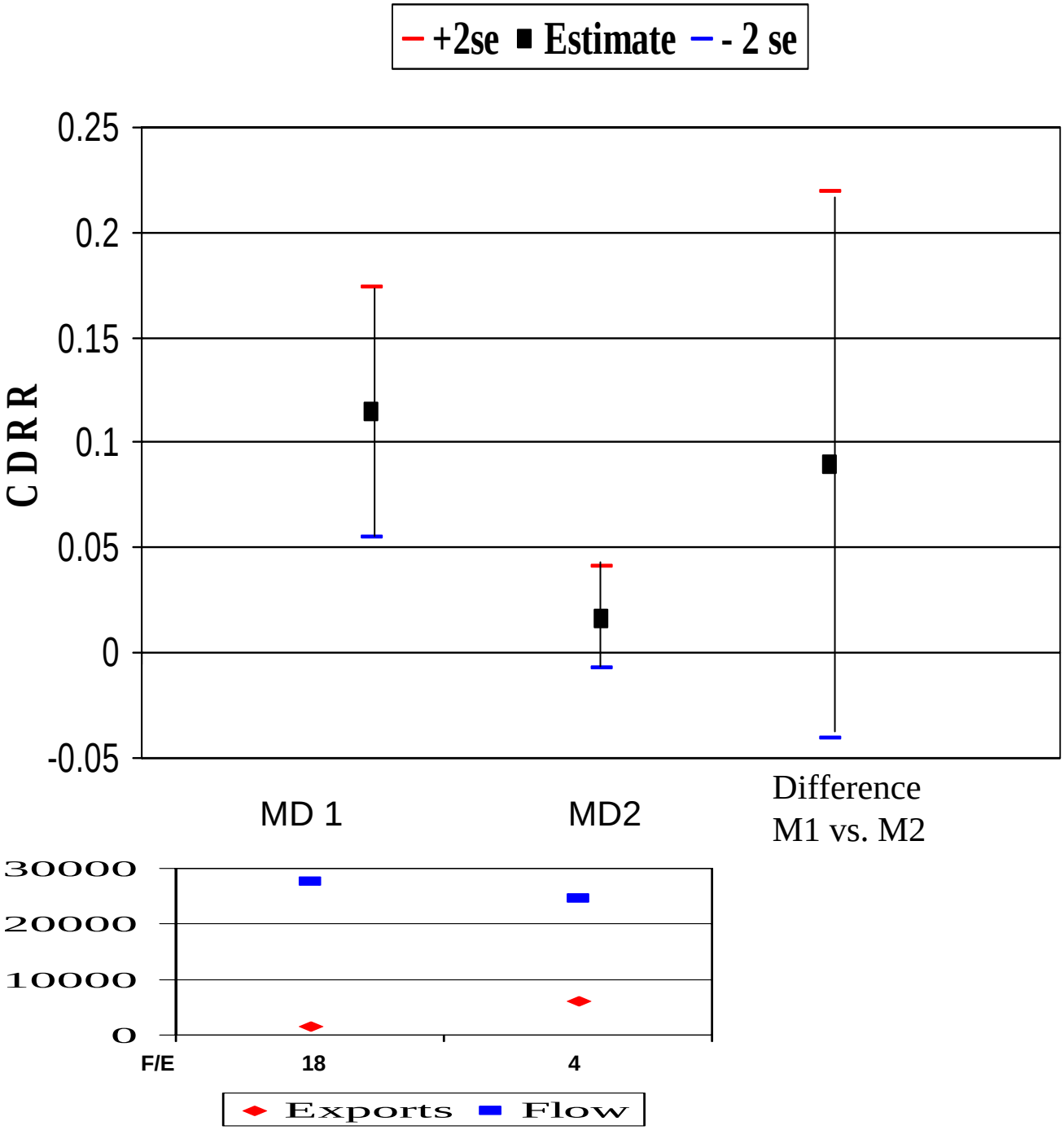
- Estimate combined recovery rate
  - from recoveries at Antioch, Chipps Island and in the ocean fishery (as available)

    (no ocean recoveries in 2004-2006)

  Recovery Rate = $\frac{\text{sum \# recovered}}{\text{\# released}}$

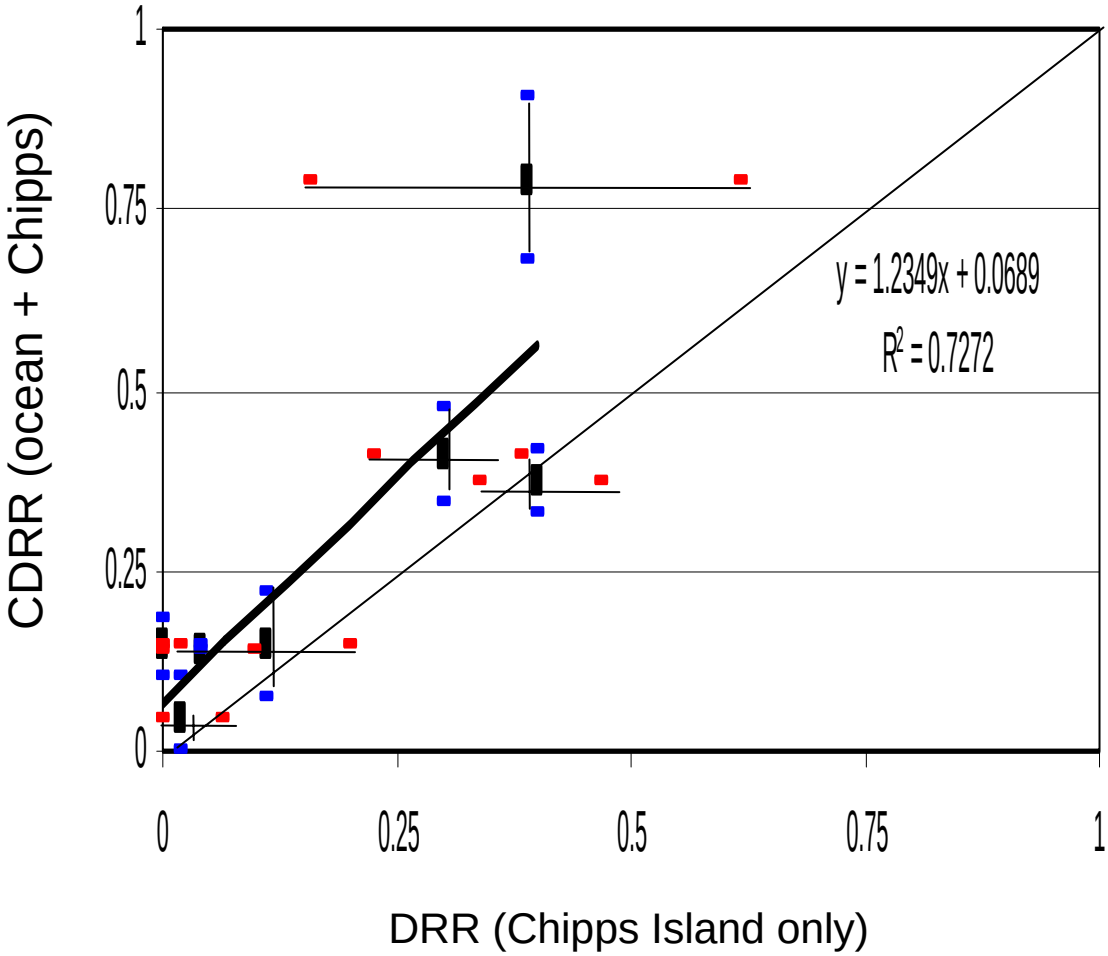
- Estimate ratio of recovery rates
  (combined differential recovery rate -CDRR)

Ratio: $\frac{\text{Recovery Rate of upstream group}}{\text{Recovery Rate of downstream group}}$

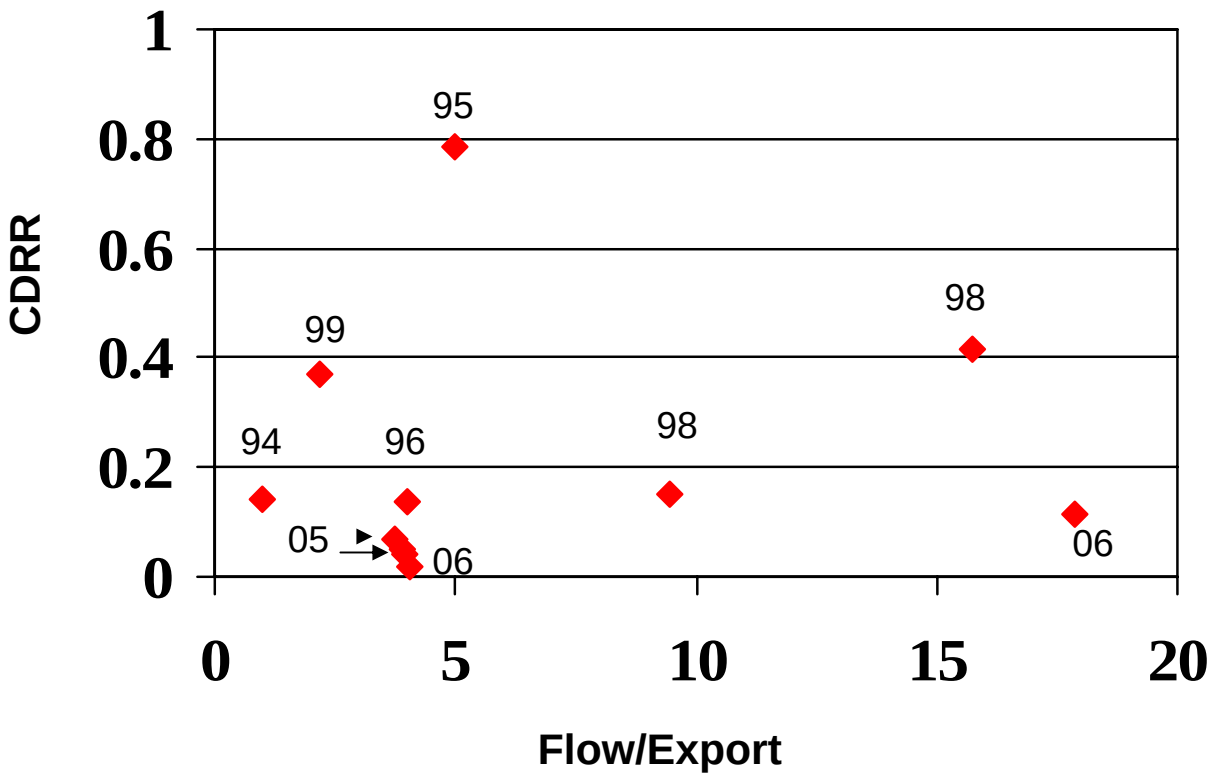


CDRR (+/- 2 SE) using Chipps Island and Antioch recoveries of smolts released at Mossdale (MD) relative to those released at Jersey Point for the first (1), second (2) release groups and their difference in 2006.

What have we learned: Survival in 2006 appears to have been higher with lower exports



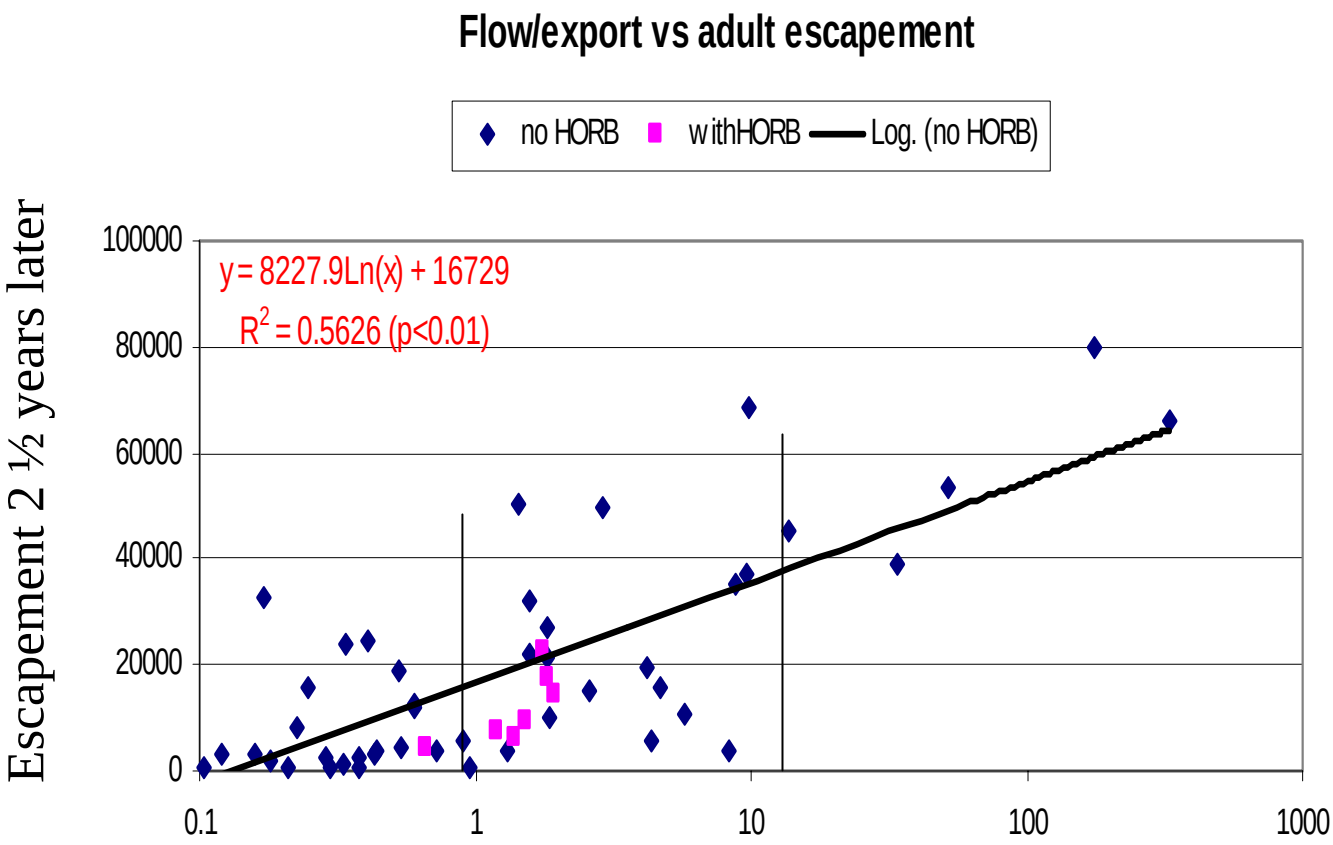
CDRR using ocean and Chipps Island recoveries versus just using Chipps Island recoveries (DRR) of the Mossdale or Durham Ferry and Jersey Point releases without the HORB in place.



No clear relationship between CDRR (DF/MD-JP survival) and flow/exports in years without a HORB.

What have we learned: No clear relationship between F/E ratio and smolt survival in range tested w/o barrier

Conceptual model of how smolt survival may vary with flow/exports



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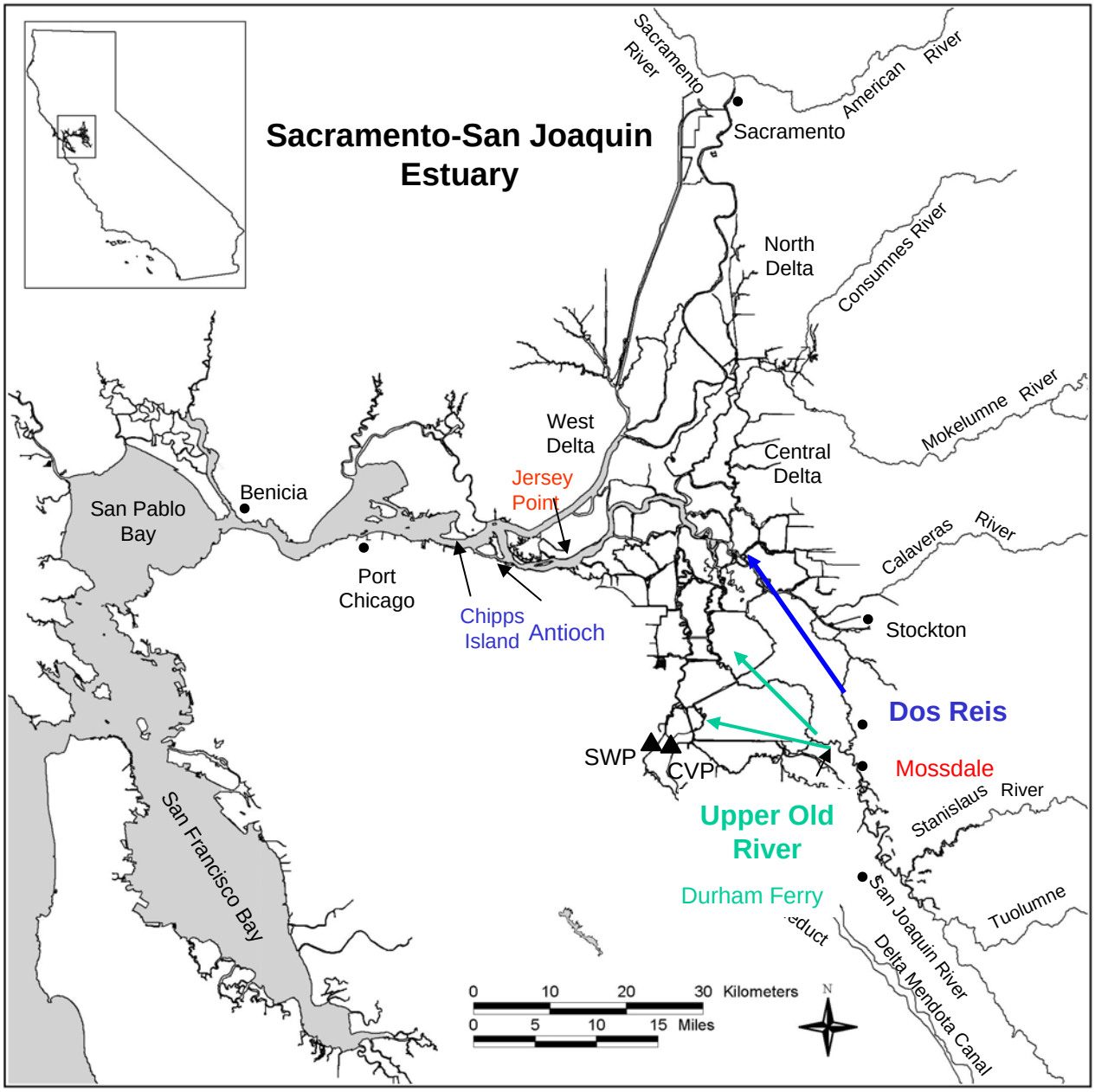
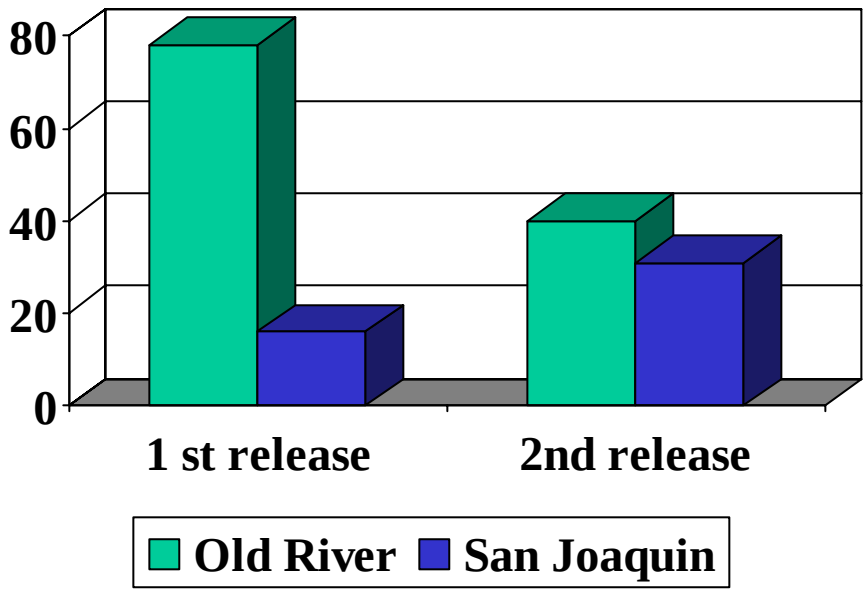
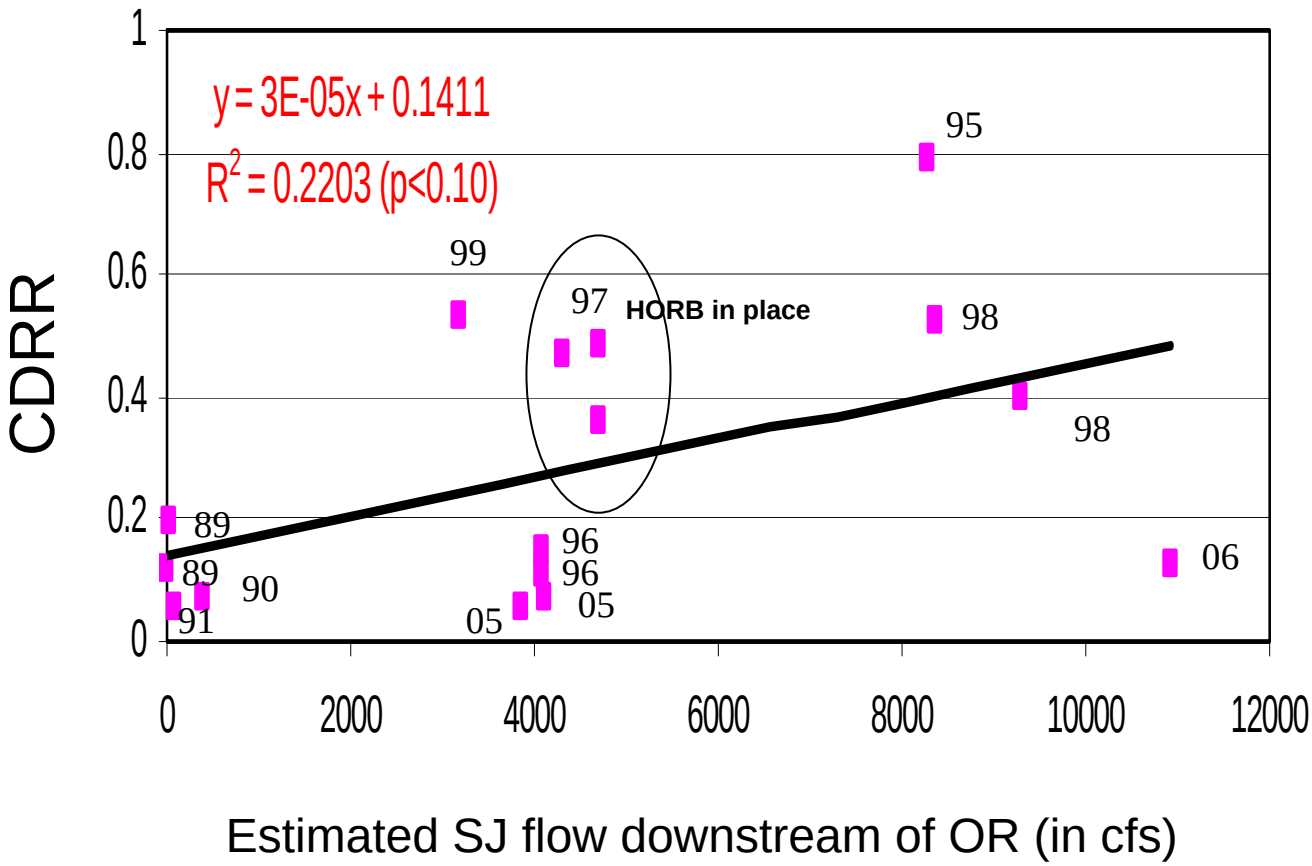


VAMP release sites in the Sacramento-San Joaquin Estuary, California.

Based on Vogel's work in 2006



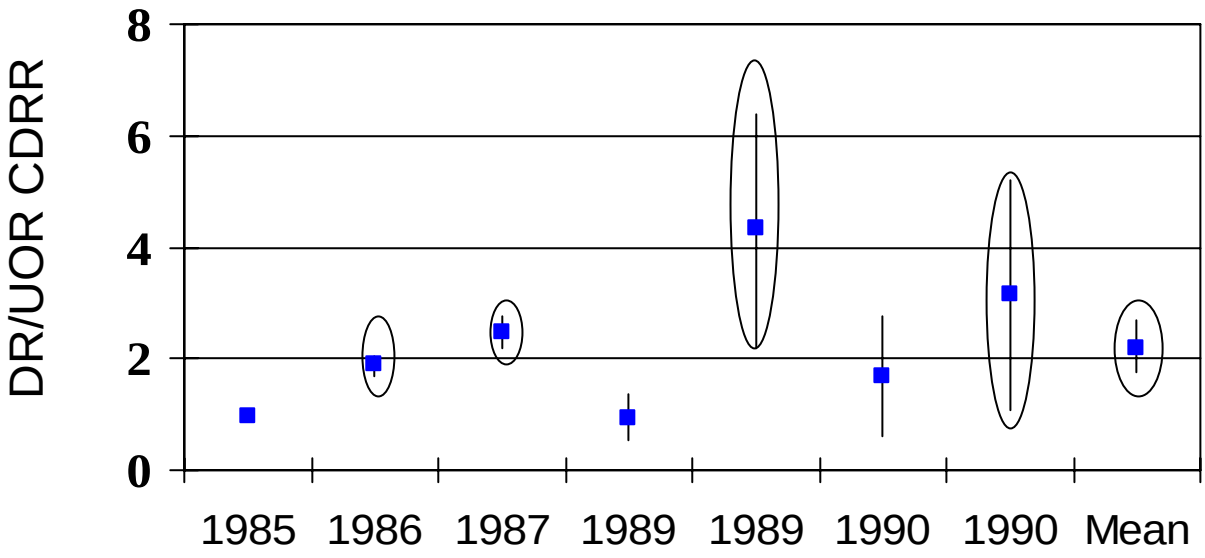
Results of ultrasonic tag detection (%) in upper Old River versus the San Joaquin River downstream of UOR during VAMP in 2006



Survival between Dos Reis and Jersey Point versus San Joaquin River flows downstream of Old River *.

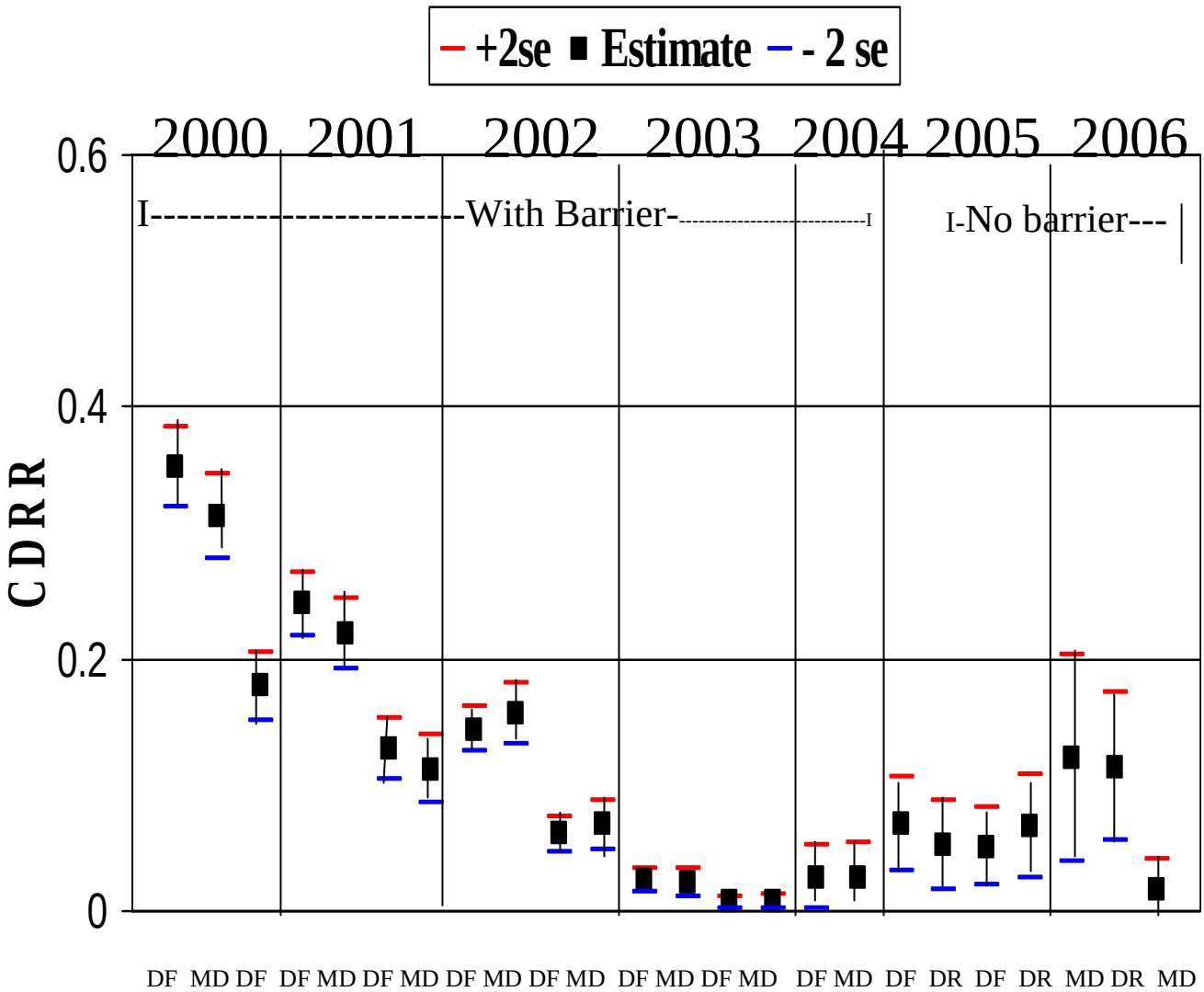
Survival on the San Joaquin River generally higher with higher flows

* Modeled DSM2 flows in 1990-2004, other estimate in 1989 and measured flows in 2005 and 2006



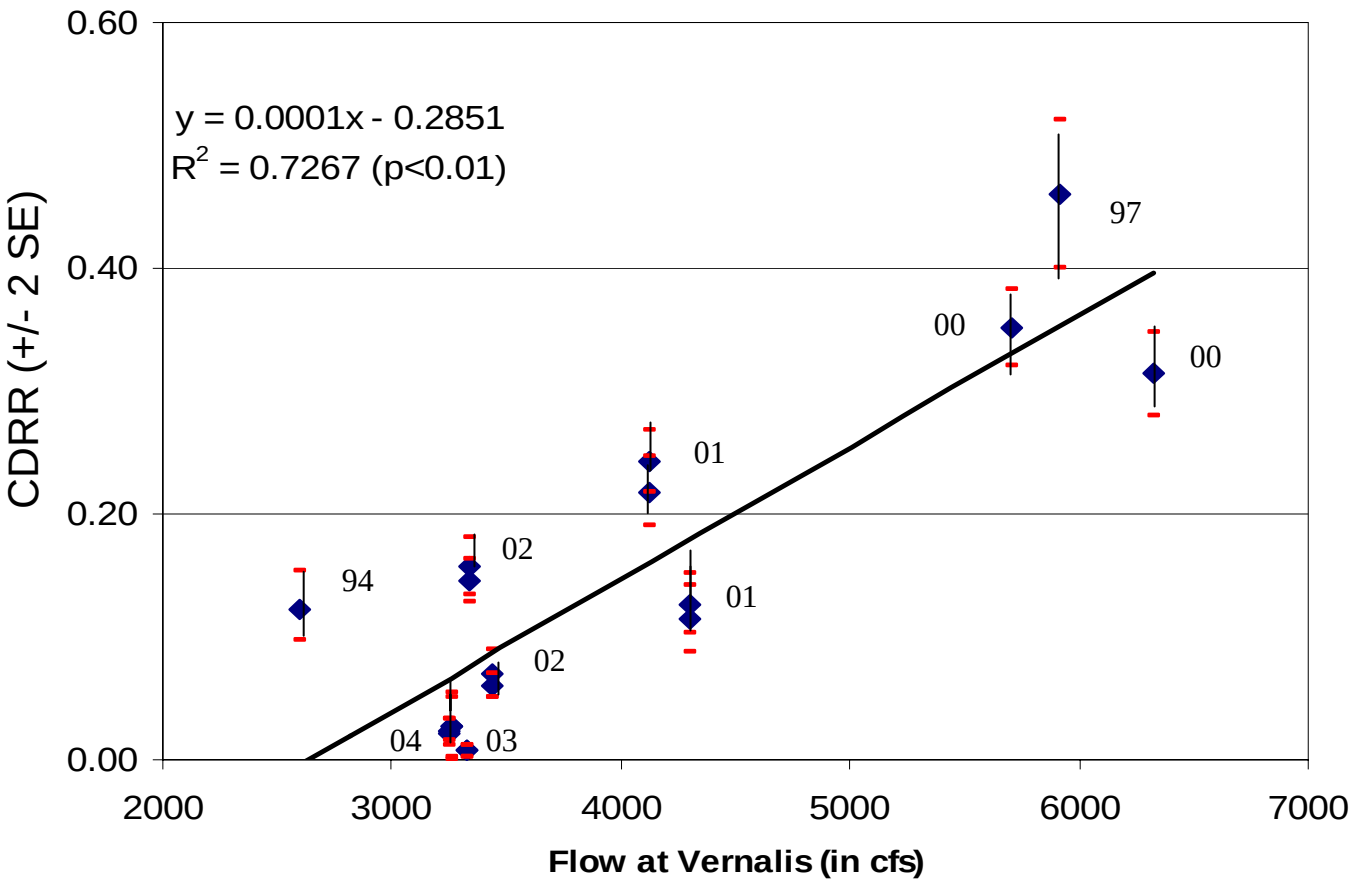
The CDRR for the Dos Reis group relative to the UOR group
Those circled are significantly different than 1.0 at 95% CI

On average better survival for those that stay on San Joaquin River rather than migrate via UOR

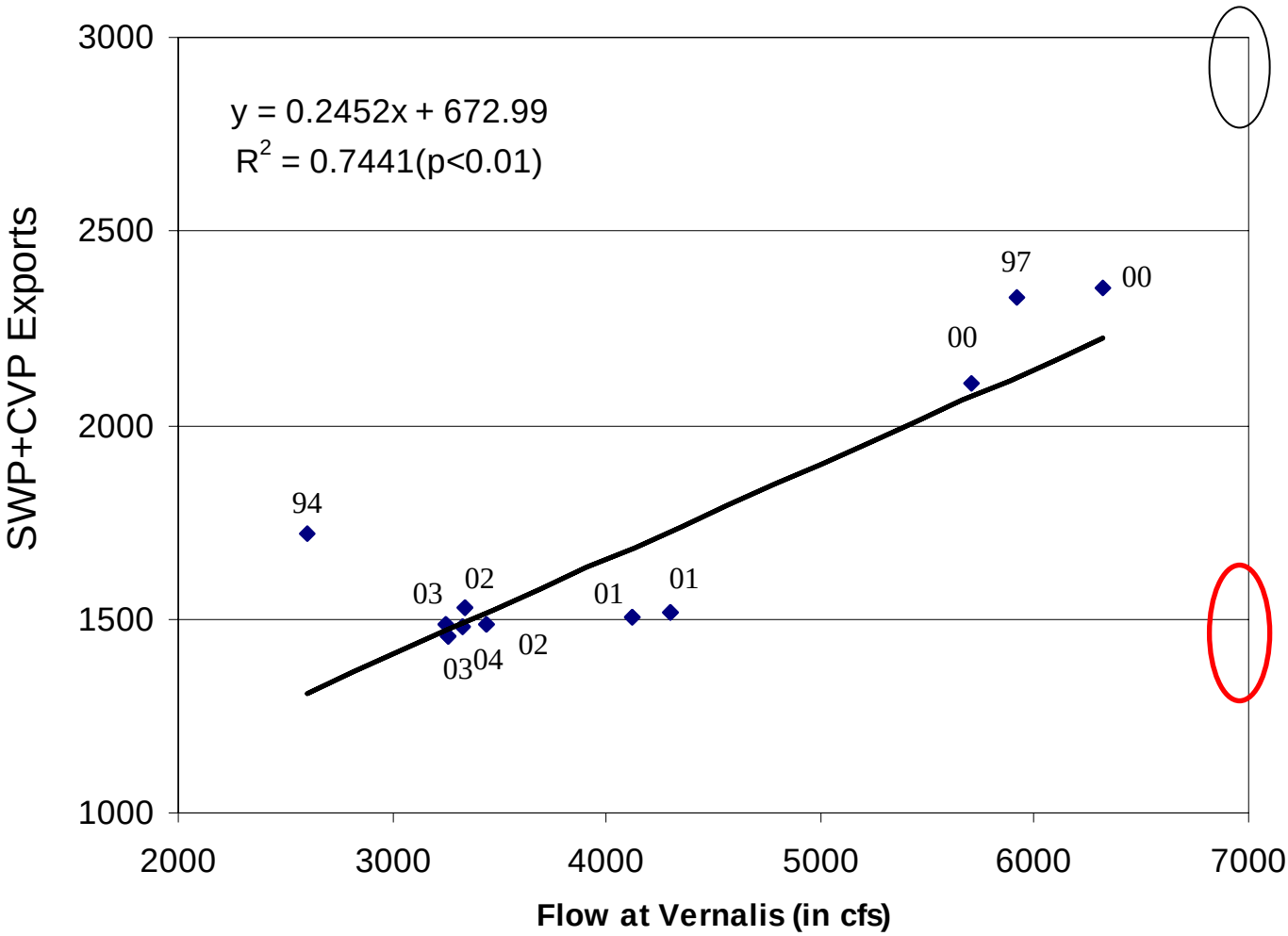


Combined Differential Recovery Rates (CDRR) (+ / - 2 SE) of CWT smolts released at Durham Ferry (DF), Mossdale (MD) and Dos Reis (DR) relative to those released at Jersey Point in 2000 – 2006.

What have we learned: Survival has been low since 2003



Survival for groups released at Mossdale and/or Durham Ferry relative to those released at Jersey Point and average flow at Vernalis in cfs



Relationship between flow and exports during VAMP tests with the HORB in place

What have we learned: Need to measure survival at exports of 1500 with a HORB in place

Vernalis Adaptive Management Plan (VAMP)

What should we do next ?

- Measure exports of 1500 with 7000 flow with HORB

- Continue testing with and without HORB

- Identify sources/locations of mortality
(Additional ultrasonic tagging work in south Delta proposed)